Center Independent Research & Development: GSFC IRAD

CubeSat Modular Deployable Solar Arrays (CMDSA)

Completed Technology Project (2016 - 2017)

Project Introduction

Advanced CubeSat missions have demanding power requirements relative to their limited available surface area that drive the need for deployable solar arrays. Vendors have not yet mastered producing cost effective, reliable systems that are readily available to the customer. This project intends to build off of Dellingr solar array design advancements by developing, building, and testing a modular hinge solution that can be used to create varying deployable array configurations and package within the allotted CubeSat dispenser volume.

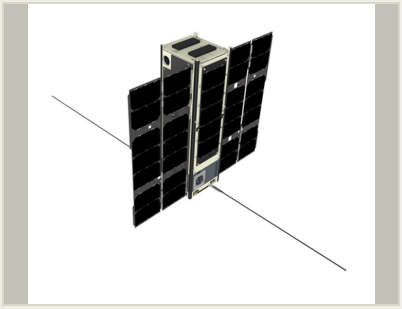
This project will develop a modular solar array hinge design that can be:

- Capable of being used on the different size faces of a CubeSat
- Scalable to varying solar array sizes
- Able to accommodate different angles
- Packaged within dispenser volume allotments

The hinge design will be incorporated into a 3U double deployable solar array prototype that will undergo environmental testing such as vibration, thermal cycling, and thermal vacuum deployments to validate the concept. Computer aided design (CAD) will be used to demonstrate how the design can be used in other solar array configurations.

Anticipated Benefits

This project will both produce a hinge design and provide a methodology for producing CubeSat deployable solar arrays. This can be utilized by future NASA CubeSat missions to produce their own deployable solar arrays. Reuse of the design will yield budget and schedule savings. It will also provide these missions with design flexibility and full transparency into the system details.



3U Double Deployable Solar Arrays

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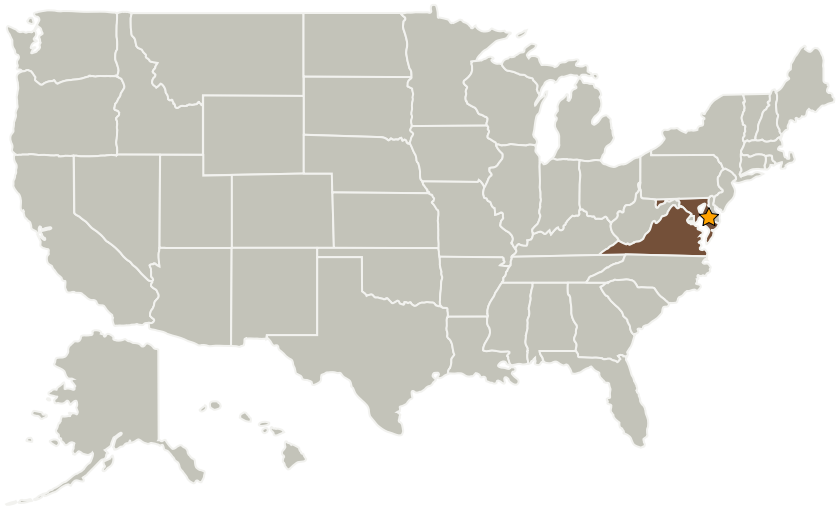
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Wallops Flight Facility(WFF)	Lead Organization	NASA Facility	Wallops Island, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

Project Transitions

October 2016: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Wallops Flight Facility (WFF)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Managers:

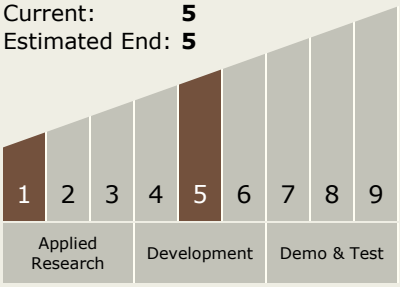
Charles D Butler
Michael A Johnson

Principal Investigator:

John D Hudeck

Technology Maturity (TRL)

Start: **1**
Current: **5**
Estimated End: **5**



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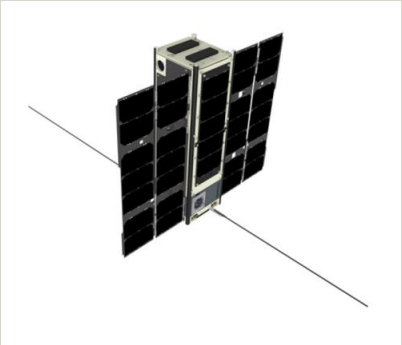
September 2017: Closed out

Closeout Summary: The purpose of the Goddard Space Flight Center's Internal Research and Development (IRAD) program is to support new technology development and to address scientific challenges. Each year, Principal Investigators (PIs) submit IRAD proposals and compete for funding for their development projects. Goddard's IRAD program supports eight Lines of Business: Astrophysics; Communications and Navigation; Cross-Cutting Technology and Capabilities; Earth Science; Heliophysics; Planetary Science; Science Small Satellites Technology; and Suborbital Platforms and Range Services.Task progress is evaluated twice a year at the Mid-term IRAD review and the end of the year. When the funding period has ended, the PIs compete again for IRAD funding or seek new sources of development and research funding or agree to external partnerships and collaborations. In some cases, when the development work has reached the appropriate Technology Readiness Level (TRL) level, the product is integrated into an actual NASA mission or used to support other government agencies. The technology may also be licensed out to the industry.The completion of a project does not necessarily indicate that the development work has stopped. The work could potentially continue in the future as a follow-on IRAD; or used in collaboration or partnership with Academia, Industry and other Government Agencies.If you are interested in partnering with NASA, see the TechPort Partnerships documentation available on the TechPort Help tab. http://techport.nasa.gov/help

Images



CubeSat with 3U Double Deployable Solar Arrays
3U Double Deployable Solar Arrays *(https://techport.nasa.gov/image/25993)*

Project Website:

https://aetd.gsfc.nasa.gov

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.3 Mechanical Systems
    - TX12.3.1 Deployables, Docking, and Interfaces

Target Destinations

Earth, The Moon, Mars